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User Acceptance Towards Web-based Learning Systems: Investigating the role of Social, Organizational and Individual factors in European Higher Education

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Abstract

Due to the rapid growth of internet technology, British universities and higher educational institutions around the world are investing heavily in web-based learning systems to support their traditional teaching and to improve their students' learning experience and performance. However, the success of an e-learning system depends on the factors that influence the students' acceptance and usage of such learning systems. So far little research has been done on the important role that social, institutional and individual factors may play in the use and adoption of the e-learning system. In this paper, the technology acceptance model (TAM) is extended to include social, institutional and individual factors in the general structural model to empirically investigate and study whether students are willing to adopt and use e-learning systems. Data were collected using a cross-sectional survey completed by a total of 604 British university students who are using web-based learning systems at Brunel University in England. After performing the satisfactory reliability and validity checks, the hypothesized research model was estimated using structural equation modeling. The results have revealed that perceived ease of use (PEOU), perceived usefulness (PU), social norms (SN), quality of work Life (QWL), computer self-efficacy (SE) and facilitating conditions (FC) are all having a significant positive influence on the adoption and usage of Blackboard system. With QWL; the newly added variable; was found to be the strongest and the most important factor. Overall, the proposed model achieves acceptable fit and explains for 69% of its variance of which is higher than that of the original TAM. Our findings have demonstrated policy makers should take into account that e-learning implementation is not simply a technological solution, but they should also address individual differences by considering a set of critical success factors such as social, institutional and individual factors.

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1. Introduction

The increasing competition among high educational institutions in the UK and elsewhere to attract students and meet their educational needs and goals has encouraged the universities to adopt and use e-learning systems [1]. E-learning, also known as Web-based learning, is referred to as the delivery of education in a flexible and easy way through the use of internet to support individual learning or organizational performance goals [2] without the constraints of time and distance [3]. E-learning systems can increasingly handle all aspects of a course for example, they include a bulletin board, chat room, private email, course content management, quizzes, peer assessment, synchronous and asynchronous communication, etc. Such features can facilitate interaction between faculty and students [4].

An e-learning system is considered to be successful if it can replicate classroom experience and consider the students' needs [5]. If the users fail to use the system then its benefits will not be fully utilized [5].

Therefore, with the proliferated use of e-learning tools in education, practitioners and policy makers need to understand the user acceptance of web-based learning systems in order to enhance the students' learning experience [4]. However, recent research emphasized that there is a limited empirical examination of the social factors [6], organizational such as facilitating conditions [3] and individual factors such as computer efficacy [7] that may affect the user adoption and acceptance of e-learning systems.

Various theoretical models have been developed (the theory of reasoned action, the theory of planned behaviour, innovation diffusion theory, unified theory of acceptance and use technology, the technology acceptance model) to investigate and explore the determinants of user's behaviour towards adoption and using information technology. Due to its acceptable explanatory power and popularity, many studies have used the Technology Acceptance Model (TAM) in the technology acceptance and adoption literature in the IS implementation area [8] and in e-learning context [9]. Although the TAM measures and predict the acceptance and usage level of technology, the existing parameters of the TAM are not enough to fully reflect to the social, organizational and individual factors.

The goal of this study is to add new variables, namely social norms (SN), quality of work Life (QWL), computer self-efficacy (SE) and facilitating conditions (FC), to the general structural model to investigate and to investigate the extent to which these variables affect students' willingness to adopt and use e-learning systems. By extending the TAM model to include the social, organizational and individual factors, policy makers and practitioners can gain a deeper understanding of the students' acceptance of e-learning technology.

The rest of the paper is organized as follows: In section two, the research model and a summary of the literature review in the field of e-learning system acceptance are provided. This is followed by the research method that guided the research in section three. Data analysis and results of the measurement and structural model are provided in section four. Finally section five discuss the main findings of the study and concludes the paper with the implications and limitations of the study.

2. Theoretical Framework

This paper proposes and tests a conceptual model of e-learning technology acceptance based on TAM and drawing from previous literature that used TAM in an educational context. The model extends TAM through the inclusion of SN, QWL, SE, and FC as additional predictor variables. The overall conceptual model is illustrated in Fig 1 and the sections which follow explain and justify each of the predicted relationships in light of previous findings from the literature.

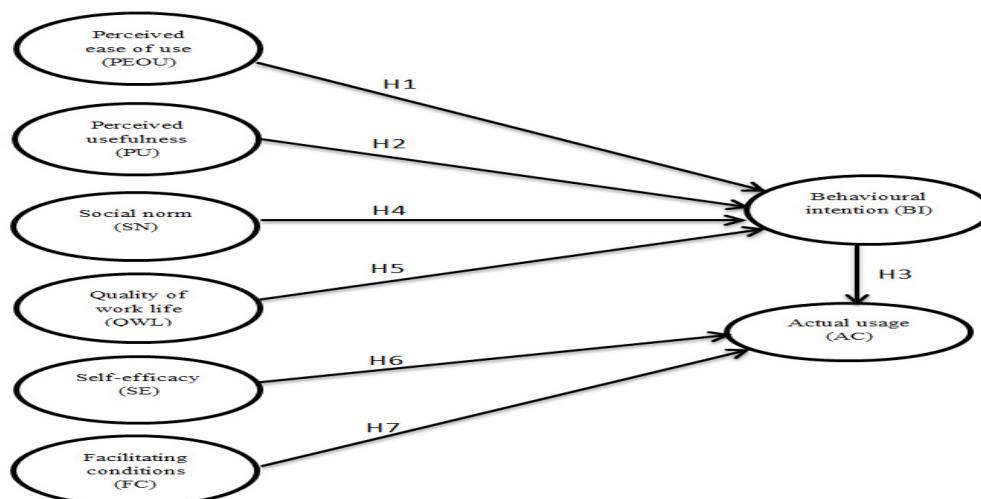


Fig 1: The Theoretical Framework

2.1. TAM Model Constructs

Many researchers have used the TAM to measure students' acceptance of Web-based learning tools, [10] [11],[12],[9],[13]. Chang [11] found that perceived ease of use (PEOU) and perceived usefulness (PU) has a direct and positive influence and effects on the intention to use the system, his result were supported by other researchers [12],[11]. In contrast, Chesney [13] concluded that PEOU did not have a direct and significant influence on the intention to use the system. Reviewing the literature, several studies in the educational context were found to be inconsistent. Some claims that PEOU had a significant influence on the intention to use the system [14]. They suggest that if students perceive an e-learning tool to be easy to use, they would also perceive the tool to be useful. On the other hand, behavioural intention (BI) is considered to be an immediate antecedent of usage behaviour and gives an indication about an individuals' readiness to perform a specific behaviour. In TAM, both PU and PEOU influence an individual's intention to use the technology, which in turns influence the usage behaviour [15]. There is good support in the literature for the relationship between BI and usage behaviour in the e-learning context [9, 11, 12]. Therefore, we propose the following hypotheses:

H1: Perceived Ease of Use will have a direct positive influence on the intention to use web-based learning System.

H2: Perceived Usefulness will have a direct positive influence on the intention to use web-based learning system.

H3: Students' BI will have a positive effect on his or her actual use of web-based learning system

2.2. Social Norms impact usage behaviour

This study extended the TAM model to include the social norm factor, in order to overcome the limitation of TAM in measuring the influence of social environments [16]. SN is defined as the person's perception that most people who are important to him or her think he or she should or should not perform the behaviour in question [17]. As mentioned by Venkatesh et al [18], the influence of SN is very complex. This research assumes the effect of SN on BI is crucial in the British context. The rationale is based on the cultural index which proposed by Hofstede [15]. He indicated that power distance (PD) (M/F) is low and Individualism (I/C) is high in England. SN is particularly crucial in a multi-religious, multi-ethnic country like England. SN has been characterized in some research as an antecedent of BI and in other studies as an antecedent PU. There has also been some inconsistency in the literature about the influence of SN on the intention to use the technology. For example, many researchers found a significant impact of SN on BI [19],[10],[16], while a number of others failed to find any impact [20]. In the current paper SN will be measured by the influence of other colleagues and instructors on students' perception to use the web-based learning system. We propose the following hypothesis:

H4: social norms will have a positive influence on student's behavioural intention to use and accept the e-learning technology.

2.3. Quality of Work Life

Quality of Work Life (QWL) was included based in some previous empirical studies in IS in order to extend and improve the TAM model [21],[10]. However, it has not previously been considered within an educational context. In this paper, QWL is defined in terms of students' perception and belief that using the technology will improve their quality of work life such as saving expenses when downloading e-journals, or in communication when using email to communicate with their instructors and colleagues. According to Tarhini et al. [10], the include of QWL in the TAM helps in better understanding the technology acceptance by users and conclude that future research should highly consider this construct due to its importance. Therefore, it is hypothesized that:

H5: QWL will have a positive influence on student's behavioural intention to use the web-based learning system

2.4. Computer self-efficacy

Self-efficacy (SE) - as an individual factor- has been defined as the belief “in one’s capabilities to organize and execute the courses of action required to produce given attainments” [22]. SE is a type of self-assessment that helps understanding human behaviour and performance in a certain tasks [22]. SE was shown to be an important predictor in determining a persons’ actual behaviour in e-learning context [23]. Therefore, it is expected that users with high SE are more likely to accept and use an e-learning system than those of low SE.

H6: Computer self-efficacy will have a positive influence on the actual usage of the web-based learning system.

2.5. Facilitating Conditions

As an organizational factor, facilitating conditions (FC) has been defined as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” [18]. More specifically, the availability of external resources (time, money and effort) and also the technological resources (PCs, broadband, etc...) needed to facilitate the performance of a particular behaviour. This factor was found to be a significant predictor in the field of technology acceptance studies [18]. Therefore, the researcher proposes the following hypothesis:

H7: Facilitating conditions will have a positive influence on the behavioural intention to adopt web-based learning system.

3. Methodology

3.1. Sample and procedure

Consistent with previous empirical research in technology acceptance e.g. [8, 18] and similar work within the e-learning context e.g. [4],[9], the current study adopted a quantitative approach to test the proposed model (see fig1). The sample was collected using a non-probabilistic, self-selection method, and should therefore be considered a convenience sample. A survey was employed due to its advantages. More specifically, the empirical data were collected by means of self-administrated questionnaire containing 29 questions. The target sample for this survey was British web-based learning system users, studying full or part time for Masters or undergraduate degrees (in a number of disciplines) at Brunel University. Participation was on a voluntary basis and no financial incentive was offered. A total of 1000 self-administered questionnaires were distributed to the students, and the number of returned questionnaires were 624 indicating a 62.4% response rate. There were 604 valid questionnaires after the exclusion of invalid questionnaires due to duplications or empty fields. Of the 604 participants, the gender split was 305 male and 289 female, with age range varied from 17 to 35 years old and their self-rated Web-based learning experience was either *some* or *experienced*.

3.2. Instrument Development and Measure

All the items (questions) used in this research have been drawn from the literature, where they were quoted to be reliable and valid to measure constructs of the phenomena that they intend to represent. Content validity and reliability was established by pilot testing the instrument with 40 students before the actual questionnaires were distributed. The students who participated in the pilot study were excluded from our sample frame.

The questionnaire consists of three main sections; 1) the demographic characteristics of the participants; 2) the main TAM constructs (perceived usefulness, perceived ease of use, behavioural intention, and usage behaviour), which were adapted from the work of [15],[24],[25]; 3) the extended TAM determinants’ (self-efficacy, facilitating conditions, social norms, perceived quality of work life), which were adopted from the work of [10], [21],[18],[6],[11].

Most of the items used in the questionnaire use a 7 point Likert scale, ranging from 1 - strongly disagree to 7- strongly agree, while Usage Behaviour construct uses scales from 1 to 6 (1 = less than once a month and 6 = several times a day) to measure the frequency and of using web-based learning system and (1 = Almost never and 6 = more than 3 hours) to measure the average of daily usage per hour. In addition, the demographics were measured on a nominal scale.

4. Data Analysis and Results

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for each construct in the model. All means were greater than 4.86 which indicate that the majority of participants express generally positive responses to the constructs that are measured in this study.

Table 1: Descriptive Statistics of the constructs

Construct	Mean	Std Deviation	Cronbach Alfa
Perceived Ease of Use (PEOU)	5.375	1.312	.927
Perceived Usefulness (PU)	5.236	1.268	.925
Social Norms (SN)	4.863	1.343	.834
Quality of Work Life (QWL)	5.554	1.302	.892
Facilitating conditions (FC)	5.039	1.531	.881
Self-Efficacy (SE)	4.950	1.130	.848
Behavioural Intention (BI)	5.669	1.275	.897
Actual Usage (Usage)	4.421	1.210	.706

4.2. Analysis of measurement model- examination of reliability and validity

The structural equation modeling (SEM) is used to test and examine the hypothesized relationships among variables within the proposed conceptual model. SEM has the ability to estimate a measurement and structure model and to assess whether a specified model ‘fits’ the collected data or not, and is mostly used to generate theories and concepts [26]. We adopt the maximum-likelihood method to estimate the model’s parameters. There are some fit indices that should be considered in order to assess the model goodness-of-fit [26]. These are the: Goodness of Fit Index (GFI); Normed Fit Index (NFI); Parsimony Normed Fit Index (PNFI); Root Mean Square Residuals (RMSR); Comparative Fit Index (CFI); Adjusted Goodness-of-Fit Index (AGFI); and the Root Mean Square Error of Approximation (RMSEA). To ensure a good fit model, some indicators (SE4, SE5, FC4, SN4) have to be deleted from the initial measurement model; the process was to delete one indicator at a time and then re-estimate the model (see table 2).

Table 2: Model fit summary for the final measurement and structural model

Fit Index	Recommended Value Hair et al, [55]	Measurement Model	Structural Model
χ^2	p < 0.05	841.173	895.461
Degrees of Freedom (df)	n/a	349	355
χ^2 / df	< 5 preferable < 3	2.410	2.522
Goodness-of-Fit Index (GFI)	> 0.90	.908	.903
Adjusted Goodness-of-Fit Index (AGFI)	> 0.80	.886	.881
Comparative Fit Index (CFI)	> 0.90	.964	.961
Root Mean Square Residuals (RMSR)	< 0.10	.063	.070

Root Mean Square Error of Approximation (RMSEA)	< 0.08	.048	.050
Normed Fit Index (NFI)	> 0.90	.940	.936
Parsimony Normed Fit Index (PNFI)	> 0.60	.808	.819

As shown in Table 2, the estimated values of fit indices have shown the good measurement model fit to the data for the proposed research model in this study. It is clear from the table that all fit indices were in the recommended range. Therefore, we can proceed to assess convergent validity, discriminant validity in addition to reliability in order to evaluate the psychometric properties of the measurement model are adequate. According to Hair [26], adequate reliability, convergent validity and discriminant validity can be found in terms of composite reliability (CR), average variance extracted (AVE), maximum shared squared variance (MSV), and average shared squared variance (ASV) as shown on the following Table 3.

Table 3: Construct reliability, convergent validity and discriminant validity

	Variance and Reliability				Factor Correlation Matrix with vAVE on the diagonal							
	CR	AVE	MSV	ASV	BI	PU	PEOU	SE	FC	SN	QWL	AU
BI	0.901	0.752	0.591	0.433	0.867							
PU	0.926	0.713	0.523	0.401	0.723	0.845						
PEOU	0.928	0.722	0.440	0.338	0.651	0.663	0.850					
SE	0.906	0.764	0.711	0.373	0.591	0.571	0.626	0.874				
FC	0.893	0.739	0.517	0.364	0.621	0.584	0.584	0.656	0.860			
SN	0.838	0.633	0.271	0.209	0.510	0.521	0.389	0.394	0.459	0.796		
QWL	0.892	0.624	0.591	0.352	0.769	0.710	0.581	0.500	0.567	0.438	0.790	
AU	0.726	0.575	0.711	0.414	0.706	0.635	0.529	0.843	0.719	0.469	0.518	0.758

Composite reliability and average variance extracted were used to estimate the reliability and convergent validity of the factors. Hair et al [26] suggest that the CR value should be greater than 0.6 and that the AVE should be greater than 0.5. As can be shown in Table 3, the average extracted variances were all above 0.575 and above 0.726 for CR. Therefore, all factors have adequate reliability and convergent validity. Additionally, with the exception of AU, the total AVE of the average value of variables used for the research model is larger than their correlation value, thus there was discriminant validity issues. However, since AU is measured by two items only, deleting one of the variables might cause un-identification problems, therefore we established discriminant validity.

Consequently, the internal consistency of the constructs was checked by Cronbach's Alpha. Cronbach's Alpha measures how well a set of items measures a single unidirectional latent construct. As shown in Table 1, all the estimated Cronbach's Alpha values for the proposed model constructs exceeded the cut-off value of 0.7 [26]. This suggests that the constructs had adequate reliability.

4.3. Analysis of the structural model and hypotheses testing

Based on the same criteria used for measurement model to measure the goodness-of-fit for the proposed model, the results of the structural model were very close to the measurement model which provides firm evidence of a good model-data fit (see Fig 2). Thus, we proceed to examine the hypothesized relationships within the model.

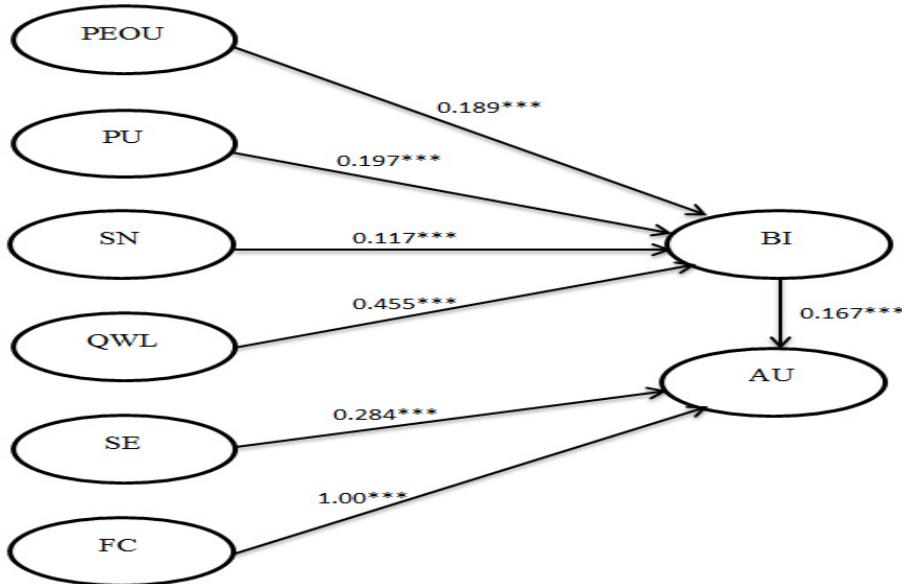


Fig 2: The research model results, (Notes: * p<0.05; ** p<0.01; *** p<0.001; NS p>0.01)

As can be shown in Fig 2, all the hypothetical relationships were supported ($P<0.001$). Perceived ease of use ($\gamma=0.189$), perceived usefulness ($\gamma=0.179$), social norms ($\gamma=0.117$) and quality of work life ($\gamma=0.455$) were found to have a significance positive impact on behavioural intention toward using Blackboard, with QWL having the strongest magnitude on the relationship with behavioural intentions. These results provide support for H1, H2, H4 and H5. On the other hand, the results implies that the computer self-efficacy ($\gamma=0.284$), facilitating condition ($\gamma=0.1$) and BI ($\beta=0.167$) had a positive significant effect on the actual usage of the system. Thus, supporting H3, H6 and H7. PEOU, PU, SN and QWL account for 69% of the variance of BI, with QWL contributing the most to behavioural intention than the other constructs.

5. Discussion and conclusion

In this paper we have extended the TAM model by incorporating new variables to the model to investigate the extent to which these variables affect students' willingness to adopt and use e-learning systems. Similar to earlier studies [10], [12], our results supports theoretically and empirically the ability of TAM to be a useful theoretical framework for better understanding the student's acceptance of e-learning technology.

We have found the newly added construct, Quality of Work Life, is the most significant construct that directly affects behavioral intention to use e-learning. Generally speaking, when students think that using the web-based learning system will improve their quality of work life, for example by saving time, money and effort, then this results in a higher behavioral intention to use the system.

In terms of perceived ease of use and perceived usefulness, our finding confirms those of other researchers [10],[12], that demonstrated PU to be the strongest of the determinants from the original TAM model. It is therefore believed that students who find the system useful in their learning process and also find the system easy to use are more likely to adopt the system. Therefore, in order to attract more users of e-learning, policy makers should improve the content quality of their e-learning systems and also provide a system which promotes ease of use and "user friendliness". Furthermore, we also found that social norm as a social context was a significant determinant on behavioural intention to use e-learning. Our results explain the role of instructors and other peers on the behaviour and perceptions of other students to adopt the system. In this context, the instructor should announce to the students that using the system is mandatory and it is also advised that practitioners should persuade users who are familiar

with the system to help in promoting it to other users. The research also shows that computer self-efficacy as an individual factor, facilitating conditions as an organizational factor and behavioural intention play an important role in the actual use of Blackboard, where the exogenous construct self-efficacy is the most significant predictor of actual use of Blackboard. The results indicated that higher self-efficacy induces a more active learning process. Furthermore, the positive significant influence of facilitating condition on actual usage of Blackboard indicates that when policy makers provide all facilities for the students to use the Blackboard, this will encourage students to use the system. The results support the findings of previous research [12],[16],[18].

Like any other research, this study had a number of limitations. Firstly, this analysis does not include investigate the impact of a set of moderators such as individual differences and cultural background. Secondly, since it was not practical to capture the actual use of the system through the student log-file, the actual use of Blackboard was measured using a self-reported questionnaire. Finally, data were collected from Brunel University students using a convenience sampling technique and thus should not necessarily be considered representative of the population. Therefore, generalization of these findings should be treated with caution.

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